

79	<i>Corvus monedula</i>	A	A	A	A
80	<i>Corvus corone cornix</i>	A	A	A	A
81	<i>Corvus corax</i>	B	B	B	B/d
82	<i>Sturnus unicolor</i>			B	B/a
83	<i>Passer hispaniolensis</i>	A	A	A	A/d
84	<i>Passer montanus</i>		A	A	A/d
85	<i>Petronia petronia</i>	B	A	A	A/d
86	<i>Fringilla coelebs</i>	A	A	A	A/d
87	<i>Serinus serinus</i>	A	A	A	A
88	<i>Carduelis carduelis</i>	A	A	A	A
89	<i>Carduelis cannabina mediterranea</i>	A	A	A	A
90	<i>Emberiza cirrus</i>	A	A	A	A
91	<i>Emberiza cia</i>	A	A	A	A/d
92	<i>Miliaria calandra</i>		A	A	A/d

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VITTORIO EMANUELE ORLANDO & GIUSEPPE VIVIANO

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Lungomare Peppino Impastato - 90049 Terrasini (PA)

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A SURVEY OF THE VISIBLE SPRING MIGRATION OF DUCKS ALONG THE TYRRHENIAN COAST OF CENTRAL ITALY

ABSTRACT - Indagine sulla migrazione primaverile visibile delle anatre lungo le coste tirreniche dell'Italia centrale.

For many species of ducks like the Garganey, *Anas querquedula*, the Shoveler, *Anas clypeata*, the Wigeon, *Anas penelope*, important flyways are located in the central Mediterranean (CRAMP & SIMMONS, 1980). In particular during spring a

great number of waterfowls migrate through Italy, the main passage involves the coasts. At the end of March an overlap in the migration period of some species of ducks occurs (CRAMP & SIMMONS, 1980; SHOGOLEV, 2000). On the North-Western coast of the Black Sea up to 3000 of garganeys were observed in a single day; in that area during the second half of March also concentrates the migration of Pintail, *Anas acuta*, and Mallard, *Anas platyrhynchos* (SHOGOLEV, 2000). Moreover along the Southern coast of Sicily several thousands of garganeys, also in large flocks, and other ducks are observed every year (IAPICHINO & MASSA, 1989; CAMPO *et alii*, 2001). Along the coast of Circeo National Park large flocks of ducks were regularly observed during spring migration (ALLAVENA, 1977). The aim of this paper is to investigate on the visible migration of garganeys and ducks along the Tyrrhenian coast of central Italy through day-time observations.

Study area and methods

A survey on the circadian migration of ducks was made between the 23rd and the 28th of March 2005 along the coast of Circeo National Park. In this area large wetlands are located along the coastline. I used a post situated in one of the highest point of the dune system, as suggested by previous studies (SHOGOLEV, 2000). From this point it was possible to observe both over sea and over the lake of Caprolace and inland. Binocular 10x42 and telescope 30x were used. Each day was divided into three three-hours periods (9:00-11:59; 12:00-14:59; 15:00-18:00).

Trying to avoid recount of the same birds I don't considered flocks with a similar number of individuals and/or specific composition of ducks observed in the same day and the day after. Moreover birds roosting at the site were considered in the count only when they were not observed the following morning. Unidentified birds were not considered in the count.

Results and discussion

I observed 3077 ducks (Tab. I) most of them were garganeys (54.6%), shovelers (25%) and wigeons (11.4%).

The migration of ducks showed an evident peak on the 26th of March when the 60.3% of birds were observed. Moreover ducks were recorded mostly in the morning ($\chi^2 = 189.9$; d.f. = 2; $p < 0.01$).

Ducks were observed migrating in flocks (Tab. I). Garganeys migrate in flocks comprising on average of 74.4 ± 20.5 , the largest flock observed on the 26th of March comprising 425 individuals, moreover 285 were seen together on the 23rd. Shovelers were observed in flocks comprising an average of 55 ± 18.7 , in particular two large flocks of respectively 270 and 135 individuals migrate on the 26th of March. The mean size flocks of wigeons was 38.9 ± 11.5 . Among the 45 flocks recorded, intraspecific aggregation was regularly observed with up to six different species of ducks in the same flock. It is interesting to report a flock containing 824 birds of the following species: Garganey, Shoveler, Wigeon, Gadwall, *Anas strepera*, Pintail and Teal, *Anas crecca*.

Tab. I - Numbers of individuals and flocks observed.

SPECIES	INDIVIDUALS (N.)	FLOCKS (N.)
<i>Anas querquedula</i>	1681	22
<i>Anas clypeata</i>	771	14
<i>Anas penelope</i>	350	9
<i>Anas strepera</i>	103	6
<i>Anas platyrhynchos</i>	72	3
<i>Anas crecca</i>	63	3
<i>Anas acuta</i>	18	3
<i>Aythya ferina</i>	18	1
<i>Aythya fuligula</i>	1	1

The peak migration period of garganey concentrates in late March (SPAGNESI *et alii*, 1988; BIANCHI *et alii*, 1969; BOANO, 1988, 1992; SORCI *et alii*, 1971; GIANNELLA & MARANGONI, 1995); in this period across Italy passes one the most important flyway for the species. Garganeys perform a loop migration, and for this reason their passage is more accentuate in Spring than in Autumn (CRAMP & SIMMONS, 1980).

Also the shovelers seem to be involved in a loop migration with return passage by more direct route; in this period Italy is heavy involved by the passage of this species (CRAMP & SIMMONS, 1980).

Ducks were observed mostly over sea; in fact only 4 flocks were observed flying inland ($\chi^2 = 2686.3$; d.f. = 1; $p < 0.001$). Similarly only two flocks, for a total of 125 garganeys, roosted on the lake; on the other hand hundreds of ducks were observed roosting on the sea.

Often ducks were observed flying towards South. In coastal areas, birds are regularly seen flying in the opposite direction of migration; however, these movements may be linked to the need to find suitable roosting or feeding sites before continuing migration and are not the result of a true migratory movement (ALERSTAM, 1978; BERTHOLD, 2001). Recent studies showed that ducks used different foraging behaviour during migration (ARZEL & ELMBERG, 2004). In particular garganey, in southern France, during spring migration added very little fuel stores, probably to limit either predation risk and the decreasing of flight efficiency (GUILLEMAIN *et alii*, 2004). Flocks were seen roosting on the sea also for hours. Moreover I observed flocks disappearing from the sight and passing again in front of the watch point after sometimes. Because of these behaviours I cannot exclude replication of data.

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MICHELE PANUCCIO

Via Mario Fioretti, 18 - 00152 Roma
E-mail: michelepan@freemail.it